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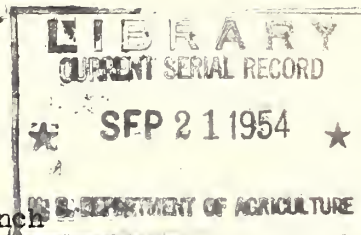
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ARTIFICIAL INSEMINATION OF CHICKENS AND TURKEYS

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A simple method of collecting semen from male chickens was developed in 1935 by W. H. Burrows and J. P. Quinn at the Agricultural Research Center, Beltsville, Md. These investigators found that ejaculation of semen could be effected by stroking or massaging the abdomens of cockerels. After the method of obtaining the semen was perfected, a method was developed for effecting complete extrusion of the orifice of the oviduct of the female, which had been found necessary for proper discharge of the semen into the oviduct. In 1937 the technique used for insemination of chickens was adapted to turkeys, with some modifications in handling the birds. In recent years, artificial insemination has been practiced as a substitute for and an adjunct to natural mating in turkey production. If the operation is carried out correctly a high percentage of fertile eggs may be expected from the flock.

Artificial insemination of poultry consists of two procedures--the obtaining of semen from the males and the actual insemination of the females.

Equipment

The equipment necessary to carry on the work consists of (1) a receiving container, (2) a 1-cubic-centimeter glass syringe graduated in hundredths, and (3) a holding container. The receiving container may be a small glass funnel, about 2 inches across at the top, the stem of which has been cut to a length of 1-1/2 inches, plugged with paraffin, and thrust through a cork or rubber stopper. The stopper should be small enough to be held between the index and middle fingers, leaving the thumb and other fingers free to massage the abdomen of the male. Use of the syringe for removing the semen from the receiving container to the holding container enables the operator to discard contaminated samples, which may occur occasionally. The syringe is used also for delivering semen into the oviduct of the hen. Some operators like to fasten a 3/4-inch piece of tapered, dull-pointed glass tubing to the tip of the syringe with a 1-1/2-inch section of flexible light-weight rubber tubing. This extends the length of the syringe tip by about an inch and is believed by some to make insemination easier.

Method of Obtaining Semen

Males, either chickens or turkeys, must be separated from hens for at least 2 days before semen can be obtained from them with any certainty or in usable quantities. If used regularly to produce semen, chicken males may be manipulated once a day or once every other day, and turkey males may be manipulated once every other day. To obtain semen, the ejaculatory response must be obtained through physical stimulation that causes the copulatory organ to be partially protruded. The stimulation may be effected by different methods of massaging and stroking the abdomen and pushing the tail upward and forward. A male's response has been obtained when the copulatory organ enlarges and is partially protruded. The operator may then take a deep grip on the copulatory organ from above the vent with his thumb and forefinger, thus fully protruding the organ, and squeeze out the semen in a short sliding motion downward. The pressure on the rear of the copulatory organ, combined with the short sliding motion, empties the terminal bulbs of the seminiferous tubules and causes the semen to run down between the two teat-like structures of the copulatory organ, where it can be collected in the funnel. Properly trained chicken males are easily manipulated and ejaculate frequently. With turkey toms only one ejaculatory response to each manipulation is the rule, but in some cases continued massage and stroking may induce a second. Additional massage may be performed as long as semen can be obtained. The process of expressing semen from the copulatory organ has been termed "milking" out the semen.

In both chickens and turkeys, the semen is more easily obtained by two operators working together. The first operator sits or stands and holds the bird loosely by the thighs, supporting its weight on his lap or on his arm. It is important that the bird be held firmly but without rigid gripping, which may greatly hinder the desired sexual response. The rear of the bird is toward the second operator, its legs slightly spread so that the abdomen is well exposed. The second operator uses the thumb and fingers of one hand to hold the receiving container and massage the lower abdomen while he pushes the tail upward and forward with the other hand. When the male responds to these pressures by starting to protrude his copulatory organ, the second operator forces the organ outward from the vent and "milks" the semen into the receiver, which he has held in readiness during the massaging.

Other methods of holding the tom turkey may be used. Some operators, because of the difficulty of handling heavyweight toms, find it expedient to hold the tom between the knees allowing the turkey to support its own weight, standing upright on the floor. In this case, the tom is placed between the knees of the first operator, who is preparing to "milk out" the semen. It has been found helpful, at Beltsville, for this operator to back up against a convenient wall in order to restrain any forward movement of the turkey. He may then use both hands alternately to massage both sides of the abdomen, starting below the vent and stroking upward toward the tail, which may be pushed upward on the completion of the stroke. When the tom responds, the milking is performed by the first operator. The second operator helps by exerting a steady downward pressure

on the shanks and collecting the semen. The downward pressure on the shanks, the upward pressure against the tail, and the massaging of both sides of the abdomen combine to effect protrusion of the tom's copulatory organ.

Recently, at Beltsville, another method of holding the tom has been devised, which is less laborious. Use is made of a narrow "milking stool", about 18 inches high, which has a shallow V-shaped or concave top to support the breast of the tom. The tom is held between the legs of the first operator, above the knees. The stool has a crosspiece at the bottom on which the operator stands, thus anchoring the stool firmly to the floor or ground. Use of the stool makes it possible for the same operator to manipulate the tom and collect the semen, although it is better to have two operators. When the tom is placed on the stool and his shanks are secured by an assistant, the first operator can use both hands alternately to massage both sides of the abdomen. The alternate stroking motions can be started on the lower part of the abdomen, with the thumb on one side of the vent and the fingers on the other, and end at the tail, which may be pushed up slightly as the stroke is ended. Forcing the tail upward and towards the bird's head serves to expose the copulatory organ. The alternate stroking not only aids in getting the copulatory organ to protrude but helps to free the cloaca of urine and feces. When protrusion is complete, the first operator may use his thumb and forefingers as pincers to "milk" out the semen. The second operator holds the legs together in a downward pull from the stool as he collects the semen. The stool method of handling the toms has proved very satisfactory in experimental work at Beltsville, providing maximum amounts of semen with a minimum of labor.

The tom is slower in protruding the copulatory organ than the chicken male. In handling an unusually recalcitrant tom, quick pressure exerted alternately with thumb and fingers at frequent intervals beneath the vent may be found helpful in getting response. It is useless to try to obtain semen from a tom or rooster if the copulatory organ is not protruded.

There are considerable differences in the ease with which semen can be obtained from individual birds. In learning the technique, it is well to try a number of birds until one is found that responds readily. After the technique is learned on such a bird, work with the others will be simpler.

Chicken males usually produce from 0.2 to 1.0 cc. of semen per manipulation, or collection, averaging about 0.5 cc. Turkey males produce from 0.05 to 0.8 cc. of semen per manipulation, averaging about 0.3 cc. Mature chicken cockerels and the older cock birds give a greater total yield if milked daily, but the average yield per collection is greater if the birds are milked only every other day. Nothing is gained by attempting to collect turkey semen oftener than once every other day. An occasional chicken or turkey male is found that will not produce any semen.

The semen of the chicken is an even white in color. If contamination with feces occurs it is obvious, because of discoloration, but contamination with urine may not be so easily detected. Urine sometimes leaks from the vent in the form of a white, flaky substance. Small white or creamy flecks of urates apparently do no harm, either to fertility or to the health of the hen, and are not considered a contamination. Any stringiness of the sample is an indication of contamination with urine. All contaminated samples should be discarded. Usually it is advisable to transfer the semen from each male, as it is collected, from the receiving container to a test tube or other storage container so that accidental contamination cannot ruin more than one sample.

The semen of the turkey is creamy in color, thick and sticky. It dries so rapidly upon exposure to the air that it must be taken up with the syringe as soon as possible after collection. Care must be taken to avoid air bubbles as much as possible. It is a good idea, when the syringe is full, to use the semen directly from it. Quantities of turkey semen as great as 3 or 4 cc. may be accumulated, but should be used immediately or, at the most, within half an hour of collection. It is not advisable to attempt to collect more than that in the holding container at one time.

Appearance of a trace of blood at the end of the first few milkings from a chicken or turkey male should not be regarded very seriously. This may occur frequently even when the milking is done with extreme gentleness. It is a signal to cease operations on the bird for the day. Some males never show a tendency to bleed, and none do so for more than a few days. No permanent harm appears to result from slight bleeding in either chickens or turkeys.

Technique of Artificial Insemination of Hens

The technique of artificial insemination of hens consists in exposing the orifice of the oviduct and injecting semen directly into it through the funnel-shaped end, which is everted (turned outward) during natural mating or as a result of manual pressure. Successful eversion of the oviduct can be effected only in hens that are in laying condition. Two operators are needed to handle the job effectively. One operator holds the hen and applies manual pressure to evert the end of the oviduct; the assistant operator injects the semen into the oviduct.

The operator holds the chicken hen with one hand under the breast, the thumb around the right leg, the index finger under the breast between the legs, and the other fingers around the left leg. He grasps the loose skin of the abdomen with the tips of the fingers, pulling the fluff feathers downward from the vent and forcing the abdominal contents into as small a space as possible. If this is properly done, the vent will protrude slightly. The other hand is placed with the thumb above the vent and the fingers extending downward at the chicken's left side of the vent. The hen's tail is forced upward with the heel of the hand. While the hen is held in this position, sudden pressure between the hands will cause the oviduct to be everted as it is in normal mating. The sooner this whole procedure is carried out after the hen has been picked up, the easier it will be to evert the oviduct.

Another method of everting the oviduct has been used at Beltsville. The operator holds the hen in the right hand a short distance from his body. Holding the hen away from the body makes it somewhat easier for the assistant operator to inject the semen into the oviduct. The hen may be held on the right hand with the thumb around the left leg, the breast in the palm of the hand, and four fingers under the abdomen between the legs. The left hand can be used to push back the tail feathers, exposing the vent. With the four fingers underneath the hen, the abdomen may be pushed in and the fluff feathers pulled down so as to compress the abdomen. Additional pressure can then be applied to evert the oviduct.

When the funnel-shaped orifice of the oviduct can be plainly seen, on the hen's left side of the vent, the syringe containing the semen is inserted as far as it will slide easily--about 1-1/2 to 2 inches. Before the injection is started, the pressure on the abdomen is brought to an end. A light pushing pressure is maintained in the syringe while the abdomen is being released, so that the syringe, following the retraction of the oviduct, will slide farther into the hen. About 1/3 of the length of the syringe is out of sight when the oviduct is fully retracted. The desired amount of semen is then injected.

Not all the calibrations on the syringe can be read when it is in place for injection, because one-third of the syringe is out of sight. To remedy this, marks indicating the amounts of semen to be used are made on the plunger, with a sharp lead pencil or otherwise. First the syringe is filled with water to the 1-cc. mark and a finger is placed over its end. Then the plunger, at the point where it enters the barrel, is held against the sharp point of the pencil, and the syringe is revolved until a mark has been drawn around the plunger. An amount of water equivalent to the injection desired is expressed from the syringe and another mark is made. This procedure is repeated until the entire length of the plunger has been marked. With the marks on the plunger as a guide, injections can then be made that will be accurate enough in quantity for practical purposes.

The turkey hen is handled somewhat differently from the chicken hen, on account of difference in size. The operator picks up the turkey hen with her head toward him and then sits down with the breast of the bird resting on his lap. The oviduct is then extruded by exerting pressure on the abdomen of the hen and by forcing the tail forward. The procedure in respect to the injection of semen is similar to that for the chicken hen. Considerable pressure may be needed to evert the oviduct properly, but less pressure will suffice if it is applied quickly rather than slowly. As with chickens, eversion of the oviduct can only be obtained from turkey hens that are in laying condition.

The recommended procedure for chickens is insemination with 0.1 cc. of semen once a week. If properly done, this should yield from 80- to 95-percent fertility. Good fertility has been obtained in some instances with 0.05 cc. of semen once a week and with 0.1 cc. of semen once in 10 days. Fertility may vary somewhat although type of treatment is the same. Where fertility is lower than expected, it may be advantageous to increase the dosage of semen or to change the routine of insemination.

With both chickens and turkeys, the highest fertility is obtained by using the semen within half an hour after it has been collected. However, 50-percent fertility may be obtained with chicken semen that has been stored at a temperature of 50 to 60° F. for several hours.

Excellent fertility has been obtained in turkey hens with 0.025 to 0.05 cc. of semen. Those that become fertile with this amount will retain their fertility for 3 to 4 weeks. A turkey hen may fail to become fertile as the result of a single insemination because of the presence in the oviduct of an egg almost ready to be laid. It is suggested that every turkey hen be palpated with a finger and that if a hard-shelled egg is felt, insemination be postponed until the egg has been laid. A good routine procedure is to inseminate with 0.025 cc. of semen every 2 weeks or with 0.05 cc. every 3 weeks. From 80- to 95-percent fertility may be expected from this procedure.

Some hens, chickens as well as turkeys, may not become fertile even with the most careful and persistent inseminations. If a record is kept, these hens can be identified and discarded.